

Math 140 Integral Practice

Evaluate the following integrals. Note: a and α are constants.

- (1) $\int x(x^2 - 1)^{99} dx$
- (2) $\int \frac{x^2}{\sqrt{2+x^3}} dx$
- (3) $\int \sin 4x dx$
- (4) $\int \frac{dx}{(2x+1)^2}$
- (5) $\int \frac{x+3}{(x^2+6x)^2} dx$
- (6) $\int \sec a\theta \tan a\theta d\theta$
- (7) $\int x^3 \sqrt[3]{2+x^4} dx$
- (8) $\int \sqrt{5x-1} dx$
- (9) $\int (2x+1)(x^2+x+1)^3 dx$
- (10) $\int \frac{2}{(4t+1)^6} dt$
- (11) $\int (1-2y)^{2.3} dy$
- (12) $\int \cos 2\theta d\theta$
- (13) $\int \cos^2(3x) dx$
- (14) $\int \frac{x}{\sqrt{x-2}} dx$
- (15) $\int x^3(1-x^2)^{3/2} dx$
- (16) $\int (\sin 3\alpha - \sin 3x) dx$
- (17) $\int \cos^4(3x) \sin(3x) dx$
- (18) $\int \sec x \tan x \sqrt{1 + \sec x} dx$
- (19) $\int \cos x \cos(\sin x) dx$
- (20) $\int \frac{3x-1}{(3x^2-2x+1)^2} dx$
- (21) $\int \frac{1}{x^2} \sqrt{1 - \frac{1}{x}} dx$
- (22) $\int \frac{x}{\sqrt{x^2+a^2}} dx$
- (23) $\int \frac{3}{\sqrt{(4-3x)^3}} dx$
- (24) $\int \tan^4(5x) \sec^2(5x) dx$
- (25) $\int \frac{x}{\sqrt{a^2-x^2}} dx$
- (26) $\int x \sqrt{a^2 - x^2} dx$
- (27) $\int x^5 \sin(x^6 + \pi/7) \cos^3(x^6 + \pi/7) dx$

Answers.

- (1) $\int x(x^2 - 1)^{99} dx = \frac{1}{200}(x^2 - 1)^{100} + C$
- (2) $\int \frac{x^2}{\sqrt{2+x^3}} dx = \frac{2}{3}\sqrt{2+x^3} + C$
- (3) $\int \sin 4x dx = -\frac{1}{4}\cos(4x) + C$
- (4) $\int \frac{dx}{(2x+1)^2} = -\frac{1}{2(2x+1)} + C$
- (5) $\int \frac{x+3}{(x^2+6x)^2} dx = -\frac{1}{2(x^2+6x)} + C$
- (6) $\int \sec a\theta \tan a\theta d\theta = \frac{1}{a}\sec(a\theta) + C$
- (7) $\int x^3 \sqrt[3]{2+x^4} dx = \frac{3}{16}(2+x^4)^{4/3} + C$
- (8) $\int \sqrt{5x-1} dx = \frac{2}{15}(5x-1)^{3/2} + C$
- (9) $\int (2x+1)(x^2+x+1)^3 dx = \frac{1}{4}(x^2+x+1)^4 + C$
- (10) $\int \frac{2}{(4t+1)^6} dt = -\frac{1}{10(4t+1)^5} + C$
- (11) $\int (1-2y)^{2.3} dy = -\frac{1}{6.6}(1-2y)^{3.3} + C$
- (12) $\int \cos 2\theta d\theta = \frac{1}{2}\sin 2\theta + C$
- (13) $\int \cos^2(3x) dx = \frac{1}{2}x + \frac{1}{12}\sin(6x) + C$
- (14) $\int \frac{x}{\sqrt{x-2}} dx = \frac{2\sqrt{x-2}(x+4)}{3} + C$
- (15) $\int x^3(1-x^2)^{3/2} dx = -\frac{1}{5}(1-x^2)^{5/2} + \frac{1}{7}(1-x^2)^{7/2} + C$
- (16) $\int (\sin 3\alpha - \sin 3x) dx = x \sin 3\alpha + \frac{1}{3}\cos 3x + C$
- (17) $\int \cos^4(3x) \sin(3x) dx = -\frac{1}{15}\cos^5(3x) + C$
- (18) $\int \sec x \tan x \sqrt{1+\sec x} dx = \frac{2}{3}(1+\sec x)^{3/2} + C$
- (19) $\int \cos x \cos(\sin x) dx = \sin(\sin x) + C$
- (20) $\int \frac{3x-1}{(3x^2-2x+1)^2} dx = \frac{-1}{2(3x^2-2x+1)} + C$
- (21) $\int \frac{1}{x^2} \sqrt{1-\frac{1}{x}} dx = \frac{2}{3}(1-\frac{1}{x})^{3/2} + C$
- (22) $\int \frac{x}{\sqrt{x^2+a^2}} dx = \sqrt{x^2+a^2} + C$
- (23) $\int \frac{3}{\sqrt{(4-3x)^3}} dx = 2(4-3x)^{-1/2} + C$
- (24) $\int \tan^4(5x) \sec^2(5x) dx = \frac{1}{25}\tan^5(5x) + C$
- (25) $\int \frac{x}{\sqrt{a^2-x^2}} dx = -\sqrt{a^2-x^2} + C$
- (26) $\int x\sqrt{a^2-x^2} dx = -\frac{1}{3}(a^2-x^2)^{3/2} + C$
- (27) $\int x^5 \sin(x^6 + \pi/7) \cos^3(x^6 + \pi/7) dx = -\frac{1}{24}\cos^4(x^6 + \pi/7) + C$

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